Abstract Text

At the dawn of the era of high-precision altimetry, before the launch of TOPEX/Poseidon, ocean tides were properly viewed as a source of noise--tidal variations in ocean height would represent a very substantial fraction of what the altimeter measures, and would have to be accurately predicted and subtracted if altimetry were to achieve its potential for ocean and climate studies. But to the extent that the altimetry could be severely contaminated by tides, it also represented an unprecedented global-scale tidal data set. These new data, together with research stimulated by the need for accurate tidal corrections, led to a renaissance in tidal studies in the oceanographic community. In this paper we review contributions of altimetry to tidal science over the past 20 years, emphasizing recent progress. Mapping of tides has now been extended from the early focus on major constituents in the open ocean to include minor constituents, (e.g., long-period tides; non-linear tides in shelf waters, and in the open ocean), and into shallow and coastal waters. Global and spatially local estimates of tidal energy balance have been refined, and the role of internal tide conversion in dissipating barotropic tidal energy is now well established through modeling, altimetry, and in situ observations. However, energy budgets for internal tides, and the role of tidal dissipation in vertical ocean mixing remain controversial topics. Altimetry may contribute to resolving some of these important questions through improved mapping of low-mode internal tides. This area has advanced significantly in recent years, with several global maps now available, and progress on constraining temporally incoherent components. For the future, new applications of altimetry (e.g., in the coastal ocean, where barotropic tidal models remain inadequate), and

new mission concepts (studies of the submesoscale with SWOT, which will require correction for internal tides) may bring us full circle, again pushing further development of tidal models as corrections.

Topic

01 20 years of Progress in Radar Altimetry: a historical perspective

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